AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application.

1. (Original) An alloyed semiconductor quantum dot comprising an alloy of at least two semiconductors, wherein the quantum dot has a homogeneous composition and is characterized by a band gap energy that is non-linearly related to the molar ratio of the at least two semiconductors.

2. (Original) The alloyed semiconductor quantum dot of claim 1, wherein the quantum dot has a quantum yield that is at least about 15%.

3.-5. (Canceled)

6. (Original) The alloyed semiconductor quantum dot of claim 1, wherein at least one of the at least two semiconductors is a Group II-Group VI semiconductor or a Group III-Group V semiconductor.

7. (Original) The alloyed semiconductor quantum dot of claim 6, wherein the quantum dot comprises an alloy selected from the group consisting of CdSeTe, CdSSe, CdSTe, ZnSeTe, ZnCdTe, CdHgS, HgCdTe, InGaAs, GaAlAs, and InGaN.

8. (Original) The alloyed semiconductor quantum dot of claim 7, wherein the alloy comprises CdSeTe and has a molecular formula $CdSe_{1-x}Te_x$, wherein the alloy comprises CdSSe and has a molecular formula $CdS_{1-x}Se_x$, the alloy comprises CdSTe and has a molecular formula $CdS_{1-x}Te_x$, the alloy comprises ZnSeTe and has a molecular formula $ZnSe_{1-x}Te_x$, the alloy comprises ZnCdTe and has a molecular formula $Zn_{1-x}Cd_xTe$, the alloy comprises CdHgS and has a molecular formula $Cd_{1-x}Hg_xS$, the alloy comprises HgCdTe and has a molecular formula HgCdTe, the alloy comprises InGaAs and has a molecular formula InGaAs, the alloy comprises GaAlAs and has a molecular formula GaAlAs, or the alloy comprises InGaN and has a molecular formula InGaN, wherein x is any fraction between 0 and 1.

9.-11. (Canceled)

12. (Original) The alloyed semiconductor quantum dot of claim 1, wherein the at least two semiconductors are CdSe and CdTe.

13.-14. (Canceled)

15. (Original) The alloyed semiconductor quantum dot of claim 1, wherein the quantum dot is conjugated to a biological agent.

16.-19. (Canceled)

20. (Original) The alloyed semiconductor quantum dot of claim 1, wherein the quantum dot is encapsulated within a polymer bead.

21. (Canceled)

22. (Original) A series of alloyed semiconductor quantum dots,

wherein each alloyed semiconductor quantum dot of the series comprises an alloy of at least two semiconductors and has a homogeneous composition,

wherein the size of each quantum dot is within about 5% of the size of the average-sized quantum dot,

wherein each of the alloyed semiconductor quantum dots of the series comprises the same alloy, but varies in molar ratio of the at least two semiconductors, and

wherein at least one of the alloyed semiconductor quantum dots of the series is characterized by a band gap energy that is non-linearly related to the molar ratio of the at least two semiconductors.

23. (Original) The series of alloyed semiconductor quantum dots of claim 22, wherein all of the alloyed semiconductor quantum dots of the series are characterized by a

band gap energy that is non-linearly related to the molar ratio of the of the at least two semiconductors.

24. (Original) The series of alloyed semiconductor quantum dots of claim 22, wherein the alloyed semiconductor quantum dots have a quantum yield that is at least about 15%.

25.-27. (Canceled)

28. (Original) The series of alloyed semiconductor quantum dots of claim 22, wherein at least one of the at least two semiconductors is a Group II-Group VI semiconductor or a Group III-Group V semiconductor.

29. (Canceled)

30. (Currently Amended) The series of alloyed semiconductor quantum dots of claim ~~29~~ 22, wherein the alloy comprises CdSeTe and has a molecular formula $CdSe_{1-x}Te_x$, wherein the alloy comprises CdSSe and has a molecular formula $CdS_{1-x}Se_x$, the alloy comprises CdSTe and has a molecular formula $CdS_{1-x}Te_x$, the alloy comprises ZnSeTe and has a molecular formula $ZnSe_{1-x}Te_x$, the alloy comprises ZnCdTe and has a molecular formula $Zn_{1-x}Cd_xTe$, the alloy comprises CdHgS and has a molecular formula $Cd_{1-x}Hg_xS$, the alloy comprises HgCdTe and has a molecular formula HgCdTe, the alloy comprises InGaAs and has a molecular formula InGaAs, the alloy comprises GaAlAs and has a molecular formula GaAlAs, or the alloy comprises InGaN and has a molecular formula InGaN, wherein x is any fraction between 0 and 1.

31.-36. (Canceled)

37. (Original) The series of alloyed semiconductor quantum dots of claim 22, wherein each of the quantum dots is conjugated to a biological agent.

38.-39. (Canceled)

40. (Original) The series of alloyed semiconductor quantum dots of claim 37, wherein each of the quantum dots is conjugated to a different biological agent, such that each of the different biological agents corresponds to a quantum dot having a unique molar ratio of the at least two semiconductors.

41.-44. (Canceled)

45. (Original) The series of alloyed semiconductor quantum dots of claim 22, wherein each of the quantum dots is encapsulated within a polymer bead.

46. (Canceled)

47. (Original) A method of detecting a target in a sample, which method comprises:

(i) contacting a sample with the alloyed semiconductor quantum dot of claim 15, wherein the biological agent specifically binds to a target in the sample,

(ii) allowing the biological agent to specifically bind to the target, and

(iii) analyzing the sample via spectroscopy, thereby obtaining a spectroscopic signature of the sample, wherein the spectroscopic signature is indicative of the presence or the absence of the target in the sample.

48.-50. (Canceled)

51. (Original) A method of detecting more than one target in a sample, which method comprises:

(i) contacting a sample with the series of alloyed semiconductor quantum dots of claim 40, wherein each of the biological agents specifically bind to a different target in the sample,

(ii) allowing the biological agents to specifically bind to the targets,

(iii) analyzing the sample via spectroscopy, thereby obtaining a spectroscopic signature of the sample, wherein the spectroscopic signature is indicative of the presence or absence of the more than one target in the sample.

52.-97. (Canceled)

98. (Original) A method of producing a ternary alloyed semiconductor quantum dot comprising an alloy of two semiconductors AB and AC, wherein A is a species that is common to the two semiconductors and B and C are each a species that is found in one of the two semiconductors, which method comprises:

(i) providing a first solution under conditions which allow nanocrystal formation to take place,

(ii) providing a second solution comprising A, B, and C under conditions which do not allow nanocrystal formation to take place, wherein A is present in the second solution at concentration that is reaction-limiting,

(iii) adding the second solution to the first solution, thereby allowing nanocrystal formation to take place,

(iv) changing the conditions to conditions that halt nanocrystal growth and formation.

99.-197. (Canceled)